3.6 Regression

Investigate p 170
Curve of Best Fit- Quadratic Regression

$a = -5 \quad b = 25 \quad c = 30$

$f(x) = -5x^2 + 25x + 30$

$R^2 = 1.0 \Rightarrow 100\%$ confidence

Appendix p 564 & 565 Creating the Curve of Best Fit

Oct 12-8:11 AM

INVESTIGATE the Math

A ball is thrown into the air from the top of a building. The table of values gives the height of the ball at different times during the flight.

Time (s)	0	1	2	3	4	5
Height (m)	30	50	60	60	50	30

What is a function that will model the data?

A. Create a scatter plot, with an appropriate scale, from the data.

B. What shape best describes the graph? Draw a curve of good fit.

C. Extend the graph to estimate the location of the zeros.

D. Use the zeros to write an equation in factored form.

E. In what direction does the parabola open? What does this tell you?

F. Using one of the points in the table, calculate the coefficient of x^2. Write the equation for the data in factored form and in standard form.

G. Using a graphing calculator and quadratic regression, determine the quadratic function model.

Oct 12-9:28 AM

Reflecting

I. How does the factored form of an equation help you determine the curve of good fit?

J. How will you know whether the equation is a good representation of your data?

K. How would your model change if it has only one zero? What if the model has no zeros?

Quad Reg
$a = -5$
$b = 25$
$c = 30$

$f(x) = -5x^2 + 25x + 30$

$y = a(x - s)(x - t)$
$y = a(x + 1)(x - 6)$
$(5, 30)$
$30 = a(5 + 1)(5 - 6)$
$30 = a(6)(-1)$
$30 = -6a$
$-6 \quad -6$
$-5 = a$
$y = -5(x + 1)(x - 6)$

Oct 12-9:29 AM

p. 177-179 5-10, 14

p177 2 b)

Edit Lists
Quad Reg

Oct 12-10:32 AM

Quadratic Regression

Enter Lists
Stat
Edit

Steps to Quad Regression
Quad Reg
Stat
Calc
5 Quad Reg
2nd 1 ,
2nd 2 ,
VARS
y vars
1
1
ENTER

Oct 6-8:53 AM

Regression Analysis

Last year, twelve randomly selected students took a mathematics aptitude test before they began their college mathematics course. Their results on the aptitude test and their final mark in the course are shown in the table. All scores are out of 100.

Student	Aptitude Test Score	Final Mathematics Mark
A	95	86
B	73	68
C	59	61
D	68	70
E	84	90
F	80	87
G	82	71
H	64	60
I	66	72
J	50	45
K	74	74
L	64	53

a) Make a scatter plot of the data and use linear regression to determine the equation of the line of best fit. Give the slope and vertical-intercept.

b) How well does the regression equation fit the data? Explain.

c) If Hannah scored 75 on the aptitude test, what would you expect her mark to be in her college mathematics course?

d) If Pietro scored 40 on the aptitude test, what would you expect his mark to be in his college mathematics course?

Apr 1-8:13 AM

Steps to Graphing a Scatter Plot on the TI-83+

STAT
1:Edit
Enter x values in L1 and y values in L2
STATPLOT (2^{nd} ,Y=)
1:Plot1
Highlight ON
WINDOW
Adjust values for the smallest and largest x-values (x-min, x-max), the smallest and largest y-values (y-min, y-max), and how many you want to count by on each axis (x-scl, y-scl).
GRAPH

Graphing a Line of Best Fit on the TI-83+

In order to graph a line of best fit and measure the correlation strength, continue with the following steps after having already done the steps above:
MODE
Change from **Float** to **2** decimal places (by highlighting 2 and pressing ENTER)
2^{nd} 0 (zero)
Curse down the alphabetical catalogue until you get to "Diagnostics On", press ENTER twice
STAT
Curse over to CALC
4:LinReg (ax + b)
2^{nd} 1
,
comma (,)
2^{nd} 2
,
comma (,)
VARS
Curse over to Y-VARS
1:Function
1:Y_1
ENTER

Oct 19-8:00 AM

The table shows some average values of these three distances, in metres, for different speeds.

Speed (km/h)	Speed (m/s)	Reaction Distance (m)	Braking Distance (m)	Stopping Distance (m)
0	0.00	0.00	0.00	0.00
20	5.56	8.33	1.77	10.11
40	11.11	16.67	7.10	23.76
60	16.67	25.00	15.96	40.96
80	22.22	33.33	28.38	61.71
100	27.78	41.67	44.35	86.01

27.0

How does the relationship between speed and reaction distance compare with the relationship between speed and braking distance?

18 m/s - R - D
B = 18.6m

Oct 19-8:00 AM

Time (h)	Bacteria Count
0	12
1	23
2	50
3	100

Height (m)	0	15	20	20	15	0

5. The population of a bacteria colony is measured every hour and results in the data shown in the table at the left. Use difference tables to determine whether the number of bacteria, $n(t)$, is a linear or quadratic function of time. Explain.

1.25hr Bacteria Count

Oct 19-8:30 AM